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10/542,076	07/13/2005	Kai Eck	DE030024US1	8935

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EXAMINER

ZEILBERGER, DANIEL

ART UNIT	PAPER NUMBER
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2624

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/542,076	Applicant(s) ECK, KAI	
	Examiner DANIEL ZEILBERGER	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 9-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 9-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to applicant's reply dated July 11th, 2008.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 11th has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. *Claims 1 and 9* are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Specifically, **claim 1** contains the limitation of "marking elements that are not visibly evident individually in the image". However, the scope of "not visibly evident individually in the image" is unclear. For example, what is "visibly evident" to a computer system, may not be "visibly evident" to a human, or even what is "visibly evident" to one entity may not be "visibly evident" to another entity. Appropriate correction is required,

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however for the purposes of examination, "marking elements that are not visibly evident individually in the image" will be interpreted as --marking elements that allow for the patient to be seen in the image at locations of the marking elements--. **Claim 9** is similarly rejected.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. *Claim 1-3, 9-11, 13-15, 17, and 19* are rejected under 35 U.S.C. 103(a) as being unpatentable over Seeley et al. (US Patent 6,484,049), hereinafter referenced as Seeley.

Regarding **claim 1**, Seeley discloses a method of determining the position of a patient in an image (see column 16 lines 3-6), the patient being located on an examination table in an imaging region (see figure 1), the method comprising:

providing a pattern of marking elements that are not visibly evident individually in the image (see column 9 lines 18-25, wherein an array or markers is provided, and further see column 13 lines 49-53, wherein it is disclosed that an image processor removes marker shadow-images from the fluoroscope image frame);

obtaining the image (see column 7 lines 19-21, wherein two dimensional projection images are captured).

In addition, while the embodiment of Seeley discussed above fails to disclose claimed "attaching the pattern of marking elements to at least one of the patient that is being imaged and the examination table", the examiner maintains that it would have been obvious, in view of an alternative embodiment, to provide:

attaching the pattern of marking elements to at least one of the patient that is being imaged and the examination table (see column 18 lines 46-66, wherein it is disclosed that affixing the marker array to the support table addresses the issue of the limited flexibility in positioning the image detector near the patient).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Seeley, by specifically providing "attaching the pattern of marking elements to at least one of the patient that is being imaged and the examination table", for the purpose of increasing flexibility in position the image detector near the patient.

Regarding **claim 2**, Seeley further discloses:

the position of the marking elements in the image is determined by a correlation of the image with at least one filter image of the pattern of the marking elements (see column 12 lines 21-33, wherein Seeley discloses that one suitable protocol takes a candidate marker P_i in image coordinates, assumes it is marker number Q_j of sheet one, and then determines how many other candidate markers support this match, i.e. line up with the expected projections of the remaining markers of one array).

Regarding **claim 3**, Seeley further discloses:

the filter image of the pattern is transformed relative to the actual pattern of the marking elements (see column 12 lines 21-33, wherein Seeley discloses that that one suitable protocol takes a candidate marker P_i in image coordinates, assumes it is marker number Q_j of sheet one, and then determines how many other candidate markers support this match, i.e. line up with the expected projections of the remaining markers of one array).

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Regarding **claim 9**, Seeley discloses an X-ray system (see figure 1 and column 7 lines 10-55), comprising:

- an X-ray source generating X-rays along a ray path (see x-ray source 22 in figure 1 and column 7 lines 10-55);

- an X-ray detector, which is disposed in the ray path of the X-ray source (see imaging assembly 24 in figure 1 and column 7 lines 10-55);

- at least one marking device in order to determine the position of the patient in an X-ray image (see column 16 lines 3-6), wherein the marking device comprises marking elements, which are not visibly evident individually in the X-ray image (see column 9 lines 18-25, wherein an array or markers is provided, and further see column 13 lines 49-53, wherein it is disclosed that an image processor removes marker shadow-images from the fluoroscope image frame);

- a data processing unit for calculation of the position of the marking elements of the marking device in an image generated with the x-ray system (see column 11 line 61 through column 12 line 33).

In addition, while the embodiment of Seeley discussed above fails to disclose claimed "at least one marking device for attachment to at least one of a patient located in an imaging region between the X-ray source and the X-ray detector and an examination table on which the patient is supported in the imaging region", the examiner maintains that it would have been obvious, in view of an alternative embodiment, to provide:

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at least one marking device for attachment to at least one of a patient located in an imaging region between the X-ray source and the X-ray detector and an examination table on which the patient is supported in the imaging region (see column 18 lines 46-66, wherein it is disclosed that affixing the marker array to the support table addresses the issue of the limited flexibility in positioning the image detector near the patient).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Seeley, by specifically providing “at least one marking device for attachment to at least one of a patient located in an imaging region between the X-ray source and the X-ray detector and an examination table on which the patient is supported in the imaging region”, for the purpose of increasing flexibility in position the image detector near the patient.

Regarding **claim 10**, Seeley further discloses:

an X-ray system set up to implement a method as claimed in claim 1 (see figure 1 and column 7 lines 10-55).

Regarding **claim 11**, Seeley further discloses:

wherein said marking elements are arranged in a pattern (see pattern 56 in figure 6).

Regarding **claim 13**, Seeley further discloses:

wherein said marking elements are applied to a transparent carrier (see column 18 lines 50-56, wherein the table or support is radiolucent).

Regarding **claim 14**, Seeley further discloses:

wherein the image is an X-ray image (see figure 1 and column 7 lines 10-55), and wherein the pattern of marking elements is remote from an X-ray detector and an X-ray source (see figure 6 and column 18 lines 46-56).

Regarding **claim 15**, Seeley further discloses:

wherein the marking device is remote from the X-ray detector and the X-ray source (see figure 6 and column 18 lines 46-56).

Regarding **claim 17**, Seeley further discloses:

performing an image processing step to reveal the pattern (see column 12 lines 21-33, wherein Seeley discloses that one suitable protocol takes a candidate marker P_i in image coordinates, assumes it is marker number Q_j of sheet one, and then determines how many other candidate markers support this match, i.e. line up with the expected projections of the remaining markers of one array).

Regarding **claim 19**, Seeley further discloses:

Wherein the marking elements are not visibly evident individually in the image, the data processing unit performing an image processing step to reveal the pattern (see

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column 12 lines 21-33, wherein Seeley discloses that one suitable protocol takes a candidate marker P_i in image coordinates, assumes it is marker number Q_j of sheet one, and then determines how many other candidate markers support this match, i.e. line up with the expected projections of the remaining markers of one array).

6. *Claims 4, 18, and 20* are rejected under 35 U.S.C. 103(a) as being unpatentable over Seeley in view of Simon et al. (US Patent 6,118,845), hereinafter referenced as Simon.

Regarding **claim 4**, Seeley further discloses:

wherein the image is generated by means of radioscopy (see figure 1 and column 7 lines 10-55).

However, Seeley fails to disclose “the marking elements exhibit a low absorption of the X-rays, the effect of which lies within the noise level of the X-ray image”.

However, the examiner maintains that it would have been obvious to one of ordinary skill, in view of Simon, to provide:

the marking elements exhibit a low absorption of the X-rays, the effect of which lies within the noise level of the X-ray image (see column 7 lines 20-20, wherein Simon discloses that once the offset of a particular image has been determined, processor 303 proceeds with eliminating the artifacts by identifying the calibration marker projections, and, for each identified projection, subtracting the acquired offsets from the pixels of the projection, wherein ideally steps 901-904 will completely eliminate the artifacts from the

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image while leaving the true underlying image, but practically image noise may prevent a perfect result, and further see column 7 lines 1-4, wherein the calibration markers are semi-transparent).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Seeley, by specifically providing “wherein the image generated by means of radioscopy, and the marking elements exhibit a low absorption of the X-rays, the effect of which lies within the noise level of the X-ray image”, as taught by Simon, for the purpose of when the imaged marks 20’ prove disturbing in the 2D projections, the imaged marks can subsequently be calculated out of the 2D projections in an image processing step.

Regarding **claim 18**, Seeley discloses everything as applied above in regards to claim 1. However, Seeley fails to disclose the limitations of claim 18. However, the examiner maintains that it would have been obvious, in view of Simon, to provide:

the pattern of marking elements with a combination of a size, a shape, and a material that renders the marking elements not visibly evident individually in the image (see column 6 lines 51-67, wherein it is disclosed that if the markers are transparent enough so that the features underlying the markers will also influence the image intensity, the marker projections may be completely eliminated while preserving the underlying image features, wherein such markers may be made from a material such as a thin layer of copper or a solid ceramic layer).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Seeley, by specifically providing the limitations of claim 18, as taught by Simon, for the purpose of completely eliminating the marker projections while preserving the underlying image features.

Regarding **claim 20**, Seeley discloses everything as applied above in regards to claim 9. However, Seeley fails to disclose the limitations of claim 20. However, the examiner maintains that it would have been obvious, in view of Simon, to provide:

the marking elements have a combination of a size, a shape, and a material that renders the marking elements not visibly evident individually in the X-ray image (see column 6 lines 51-67, wherein it is disclosed that if the markers are transparent enough so that the features underlying the markers will also influence the image intensity, the marker projections may be completely eliminated while preserving the underlying image features, wherein such markers may be made from a material such as a thin layer of copper or a solid ceramic layer).

Therefore, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Seeley, by specifically providing the limitations of claim 20, as taught by Simon, for the purpose of completely eliminating the marker projections while preserving the underlying image features.

7. *Claims 5 and 16* are rejected under 35 U.S.C. 103(a) as being unpatentable over Seeley in view of Erbel et al. (US Patent Application 2002/0122530), hereinafter referenced as Erbel.

Regarding **claim 5**, Seeley discloses everything as applied above in regards to claim 1. However, Seeley fails to disclose “wherein the position of at least one further object is determined in the image, wherein a second pattern of marking elements, which do not show up individually in the image, is attached to the further object, and wherein the second pattern is different from the first pattern”. However, the examiner maintains that it would have been obvious, in view of Erbel, to provide:

wherein the position of at least one further object is determined in the image, wherein a second pattern of marking elements, which do not show up individually in the image, is attached to the further object, and wherein the second pattern is different from the first pattern (see Erbel figure 4 and paragraph 32, wherein Erbel discloses a computer tomography, wherein a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, and further see figure 5 and paragraph 33, wherein Erbel further discloses patient marking having the reference numeral 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Seeley, by specifically providing “wherein the position of at least one further object is determined in the image, wherein a second pattern of marking elements, which do not show up individually in the image, is attached to the further object, and wherein the second pattern is different from the first pattern”, as

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taught by Erbel, for the purpose of detecting the position of both the bed and the patient so that the patient can be positioned correctly on the bed, while the patient markings are not recorded in the image thus not degrading image quality.

Regarding **claim 16**, Seeley discloses everything as applied above in regards to claim 15. However, Seeley fails to disclose “another marking device remote from the X-ray detector, the X-ray source and the marking device, wherein the another marking device comprises other marking elements that are not visibly evident individually in the X-rat image, and wherein the another marking device is attached to the patient”. However, the examiner maintains that it would have been obvious, in view of Erbel, to provide:

another marking device remote from the X-ray detector, the X-ray source and the marking device, wherein the another marking device comprises other marking elements that are not visibly evident individually in the X-rat image, and wherein the another marking device is attached to the patient (see Erbel figure 4 and paragraph 32, wherein Erbel discloses a computer tomography, wherein a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, and further see figure 5 and paragraph 33, wherein Erbel further discloses patient marking having the reference numeral 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Seeley, by specifically providing “another marking device remote from the X-ray detector, the X-ray source and the marking device, wherein the

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another marking device comprises other marking elements that are not visibly evident individually in the X-rat image, and wherein the another marking device is attached to the patient”, as taught by Erbel, for the purpose of detecting the position of both the bed and the patient so that the patient can be positioned correctly on the bed, while the patient markings are not recorded in the image thus not degrading image quality.

8. *Claim 12* is rejected under 35 U.S.C. 103(a) as being unpatentable over Seeley in view of Ogawa (US Patent 5,572,251), hereinafter referenced as Ogawa.

Regarding **claim 12**, Seeley discloses everything as applied above in regards to claim 11. However, Seeley fails to disclose “said pattern is a two-dimensional, cyclical binary maximum-length sequence”. However, the examiner maintains that it would have been obvious, in view of Ogawa, to provide:

said pattern is a two-dimensional, cyclical binary maximum-length sequence (see Ogawa column 4 line 66 through column 5 line 45, wherein it is disclosed that by having a binary maximum length sequence pattern of elements in between the object being imaged and image sensor, when the object of interest encompasses only a region of the pattern, the location of the object in relation to the pattern can be uniquely determined).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “said pattern is a two-dimensional, cyclical binary maximum-length sequence”, as taught by Ogawa, for the purpose of being capable of determining the location of the patient in relation to the

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pattern of elements when the region of the patient being imaged is smaller than the total area of the pattern of elements.

Response to Arguments

9. Applicant's arguments with respect to claims 1-5, 9-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL ZEILBERGER whose telephone number is (571)270-3570. The examiner can normally be reached on M-F 8:30-6pm est (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikram Bali can be reached on (571)272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Daniel Zeilberger
Examiner
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08/19/2008

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